



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/518,105

12/10/2004

Yasushi Akiyama

2002JP309

5320

26289 7590 05/23/2008
AZ ELECTRONIC MATERIALS USA CORP.
ATTENTION: INDUSTRIAL PROPERTY DEPT.
70 MEISTER AVENUE
SOMERVILLE, NJ 08876

EXAMINER

THOMPSON RUMMEL, PONDER N

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

05/23/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/518,105	Applicant(s) AKIYAMA ET AL.	
	Examiner PONDER N. THOMPSON RUMMEL	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 March 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 2 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-2 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 6, 2008 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takano et al. (JP 2002006514).

With regards to claims 1 and 2, Takano et al. discloses composition for forming a patterned resist wherein the composition contains a surfactant that is a C₄ to C₁₀ perfluoroalkylsulfonic salts (paragraph [0018]) that is used in the process of forming a resist pattern (paragraph [0016]).

The process of forming a resist pattern which increases the reduction of the thickness of the chemically amplified resist after development by 10 Å to 500 Å in

comparison with the case of not applying the composition for reducing development (paragraphs [0016] and [0017]) includes:

- forming a coating using the chemically amplified resist which contains a surfactant (paragraph [0018]) onto a substrate having a diameter of 8 inches thick or more by application (paragraphs [0015], [0016] and [0027]);
- baking (pre-baking and post-baking – (paragraph [0024])) and then exposure of the resist by light source (paragraph [0030]); and
- developing the resist coating (paragraphs [0016] and [0017]).

Takano et al. does not teach the specific ratio of the surfactant of acid to base of 1:1.04 to 1:3 of claims 1 and 2. Takano teaches that adjusting the mixing ratio of the acid to base affects the reduction of thickness of the resist. The film loss in quantity at the time of development can be adjusted (paragraph [0019]). Therefore, the mixing ratio is the result effective variable. As such, it is optimizable (In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) MPEP 2144.05). It would have been obvious to one of ordinary skill in the art to optimize the ratio of the surfactant because adjusting the mixing ratio directly affects the film loss of the resist.

Response to Arguments

4. Applicant's arguments filed March 6, 2008 have been fully considered but they are not persuasive. Applicant argues that Tanako does not explicitly show an example of bases being added in excess to an acid. Although Takano does not show an

example of base added in excess of acid, Takano suggests that by adjusting the mixing ration of the acid to base that reduction of thickness of the film will occur. Whether there is more acid in excess of base or more base in excess of acid is irrelevant because the addition of acid or base to reduce film thickness is a result effective variable.

5. In response to the acidity and basicity of the composition, Tanako does mention that the preferred composition should have a pH between 1.5-4.5 (paragraph [0018]). However, Tanako notes that in *negative* working amplified resist that the composition is weakly acidic. This would suggest that one could add a basic surfactant such as an ammonium salt, to the composition to obtain the desired results. Further, Tanako states that those amine salts or ammonium acids mixed together in aqueous solution can be used as well (paragraph [0019]). One of ordinary skill in the art would conclude from the information provided by Tanako in paragraph [0018] that in a negative or positive resist that the acidity or basicity is a factor in adjusting the amount of thickness of the resist coating (paragraph [0020]).

6. With regard to improving the coating properties, Tanako does mention additional ways in which to optimize the reduction in film (paragraph 0021 and 0026). However, water-soluble organic solvent used with water improves coating properties. Coating properties does not necessarily apply to the reduction of film thickness. Coating properties could mean the reduction in film wrinkles, cracks, adhesion as well as thickness. Tanako does not mention which particular coating properties are affected by the uses or an organic solvent with water. Further, Tanako suggest that adjusting the

Art Unit: 1774

acid to base ratio of the surfactant is preferred to optimize the amount of reduction in thickness of the resist layer (paragraph [0020], lines 3-6). Tanako additionally state that the various additives may be added, if necessary (as this is not a must), to decrease development defects such as thickness (paragraph [0021]) Therefore, it would have been obvious for one of ordinary skill within the art to conclude that the most important factor in adjusting the film thickness is by adjusting the acidity of the surfactant for the other various additives such as a water-soluble organic acid are not necessary to add within the composition to reduce film thickness.

7. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., pH of the surfactant) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

8. With regards to the pH limits, Tanako suggest that the pH can be properly adjusted depending upon the type of amplified resist to be used or processing conditions (paragraph [0020]). Tanako also teaches that in a photoresist, the pH is preferably 1.7 to 3.5. If more base is added, as one skilled within the art would know that the pH would be above the range. However, the pH of the composition as argued was not claimed.

9. With regard to argument on suggestion or teaching that the amount of base can be increase s so that it exceeds the amount of acid, Tanako discloses that the basicity

Art Unit: 1774

of the composition can be adjusted in consideration of the kind of chemically amplified resist used by mixing an organic acid to amine or ammonium (paragraph [0020]).

10. With regard to the applicant's argument of the claimed acid to base ratio of 1:1.04 -1.3, Tanako as stated above suggest that the ratio can be adjusted. One of ordinary skill within the art would know how to adjust the ratios to achieve the desired effect. Further, the composition as disclosed by Tanako comprises each and every aspect of the claim invention with the exception of the acid to base ratio within the surfactant. The amended ranges of the surfactant (1:1.04-1:3) are so close to the ranges as claimed by the applicant within the original claims that there would not be any difference (whether functional or structural) within the claimed composition (*Titanium Metals Corp. v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985)).

11. In response to applicant's argument regarding teaching of increasing the base as opposed the acid within the composition, Tanako does suggest that the reduction of film thickness can be obtained if one would adjust the amounts of acid and base within the surfactant (paragraph 0020). Although Tanako does not provide examples where the amount of base exceeded the acid to obtain film thickness, Tanako does teach that such mixing would be apparent or else the addition of more acid to base would not have been noted as being preferred to adding just acid or base (paragraph [0020]) to obtain reduction in film thickness.

12. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon

hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

13. The declaration filed under 37 CFR 1.132 filed March 6, 2008 is insufficient to overcome the rejection of claims 1 and 2. Applicant has not included the lower endpoint of a ratio of 1:104 in the comparison and should consider doing so. Upon review of examples 2-6, Example 2 shows that the pattern profile at a ratio of 1:1 is almost rectangular. Example 3 shows a ratio of 1:1.3 wherein the shape is rectangular. There is a huge gap between the ranges of Example 2 and Example 3 leading one of ordinary skill in the art to believe that the pattern profile would be expected to be rectangular. This is due to the amount of base added in Example 2, wherein applicant's claimed range of 1:1.04, is very close to the range of 1:1 (example 2). Therefore, the results are not commensurate in scope with the claims. It is suggested that applicant consider submitting a comparison example including the lower end point of 1:1.04 (MPEP 716).

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to PONDER N. THOMPSON RUMMEL whose telephone number is (571)272-9816. The examiner can normally be reached on Monday-Friday 7:00 am - 4:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/P. N. T./
Examiner, Art Unit 1795

/Cynthia H Kelly/
Supervisory Patent Examiner, Art Unit 1795

Notice of References Cited	Application/Control No. 10/518,105	Applicant(s)/Patent Under Reexamination AKIYAMA ET AL.	
	Examiner PONDER N. THOMPSON	Art Unit 1795	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-			
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N	JP 2002006514 A	01-2002	Japan	TAKANO et al.	
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-006514

(43)Date of publication of application : (09.01.2002)

(51)Int. Cl.

G03F 7/38

H01L 21/027

(21)Application number : 2000-191364 (71)Applicant : CLARIANT (JAPAN) KK

(22)Date of filing : 26.06.2000 (72)Inventor : TAKANO YUSUKE
IJIMA ICHIYO
FUNATO SATORU
MURAKAMI YOSHIO
TANAKA HATSUYUKI

(54) DEVELOPMENT DEFECT PREVENTING PROCESS AND MATERIAL

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a method for forming a resist pattern, free of the deterioration of its pattern shape, such as a T-top and a round top caused by the influence of the processing atmosphere and the intermixture of surface coating and a resist and nonconforming particularly to a step of etching a chemical amplification photoresist, as well as to reduce development defects in a resist on a large diameter substrate of ≥ 8 inches in development.

SOLUTION: In the method for forming a resist pattern, a development defect reducing composition, e.g. comprising an acidic composition containing a surfactant is applied on a chemical amplification photoresist film formed on a substrate of ≥ 8 inches for preventing the formation of a layer which is hardly soluble in a developing solution on the surface of the resist as well, as to make the surface of the resist hydrophilic and to increase the reduction of the thickness of the chemical amplification photoresist film after exposure and development by 10-500 μm , by an appropriate degree of diffusion of an acid from the development defect reducing composition, as compared with the case where the composition is not coated.

LEGAL STATUS

[Date of request for examination] 04.07.2000

[Date of sending the examiner's decision of rejection]



AN EQUAL OPPORTUNITY EMPLOYER

22 20
 C014244842
 \$01.170
 MAY 23 2009
 MAILED FROM ZIP CODE 22314
 22314